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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Katsumi Yamamoto

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EXAMINER

PRENTY, MARK V

ART UNIT

PAPER NUMBER

2822

DATE MAILED: 06/02/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

10/603,727

Applicant(s)

YAMAMOTO, KATSUMI

Examiner

MARK V PRENTY

Art Unit

2822

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 29 April 2004.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-14 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-4, 6-11, 13 and 14 is/are rejected.
- 7) ☒ Claim(s) 5 and 12 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 24 June 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☒ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

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This Office Action is in response to the response filed on April 29, 2004.

Applicant's election without traverse of Group I, claims 1-14, is acknowledged.

Claims 1-3, 6, 8-10 and 13 are rejected under 35 U.S.C. 102(b) as being anticipated by Wada (United States Patent 5,371,384).

With respect to independent claim 1, Wada discloses (see the entire patent, particularly the Figs. 6, 14 and 15 disclosure and column 9, line 62, through column 10, line 11) an image sensor comprising: a plurality of pixels 2 formed in a semiconductor substrate 4, each pixel including a light sensitive element, a micro-lens 23 over each of said light sensitive elements; and a trench structure 34/41 surrounding each of said micro-lenses (see Fig. 6 together with Fig. 14 and column 10, lines 9-11).

Claim 1 is thus rejected under 35 U.S.C. 102(b) as being anticipated by Wada.

With respect to dependent claim 2, Wada's trench structure is circular (see column 9, lines 1-7, and column 9, line 62, through column 10, line 11).

Claim 2 is thus rejected under 35 U.S.C. 102(b) as being anticipated by Wada.

With respect to dependent claim 3, Wada's trench structure has a rectangular cross-section (see Fig. 14).

Claim 3 is thus rejected under 35 U.S.C. 102(b) as being anticipated by Wada.

With respect to dependent claim 6, Wada's trench structure is formed in a layer that underlies said micro-lenses (i.e., Fig. 14's trench structure 34/41 would extend into Fig. 6's layer 21).

Claim 6 is thus rejected under 35 U.S.C. 102(b) as being anticipated by Wada.

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With respect to independent claim 8, Wada discloses (see the entire patent, particularly the Figs. 6, 14 and 15 disclosure and column 9, line 62, through column 10, line 11) a pixel of an image sensor comprising: a light sensitive element 2 formed in a semiconductor substrate 4; a micro-lens 23 over said light sensitive element; and a trench structure 34/41 surrounding said micro-lens (see Fig. 6 together with Fig. 14 and column 10, lines 9-11).

Claim 8 is thus rejected under 35 U.S.C. 102(b) as being anticipated by Wada.

With respect to dependent claim 9, Wada's trench structure is circular (see column 9, lines 1-7, and column 9, line 62, through column 10, line 11).

Claim 9 is thus rejected under 35 U.S.C. 102(b) as being anticipated by Wada.

With respect to dependent claim 10, Wada's trench structure has a rectangular cross-section (see Fig. 14).

Claim 10 is thus rejected under 35 U.S.C. 102(b) as being anticipated by Wada.

With respect to dependent claim 13, Wada's trench structure is formed in a layer that underlies said micro-lenses (i.e., Fig. 14's trench structure 34/41 would extend into Fig. 6's layer 21).

Claim 13 is thus rejected under 35 U.S.C. 102(b) as being anticipated by Wada.

Claims 4 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wada (United States Patent 5,371,384) together with Sawaki et al. (United States Patent 5,768,023 – hereafter Sawaki).

Claim 4 depends on independent claim 1. The explanation of the above rejection of independent claim 1 under 35 U.S.C. 102(b) as being anticipated by Wada is hereby incorporated by reference into this rejection of dependent claim 4 under 35 U.S.C. 103(a) as being unpatentable over Wada together with Sawaki.

The difference, therefore, between claim 4 and Wada is claim 4's micro-lenses are formed from polymethylmethacrylate (PMMA) or polyglycidylmethacrylate (PGMA).

Sawaki teaches that micro-lenses are conventionally formed of PMMA (see the entire patent, including column 6, lines 62-64).

It would have been obvious to one skilled in this art to form Wada's micro-lenses of PMMA because Sawaki teaches that micro-lenses are conventionally formed of PMMA.

Claim 4 is thus rejected under 35 U.S.C. 103(a) as being unpatentable over Wada together with Sawaki.

Claim 11 depends on independent claim 8. The explanation of the above rejection of independent claim 8 under 35 U.S.C. 102(b) as being anticipated by Wada is hereby incorporated by reference into this rejection of dependent claim 11 under 35 U.S.C. 103(a) as being unpatentable over Wada together with Sawaki.

The difference, therefore, between claim 11 and Wada is claim 11's micro-lenses are formed from polymethylmethacrylate (PMMA) or polyglycidylmethacrylate (PGMA).

Sawaki teaches that micro-lenses are conventionally formed of PMMA (see the entire patent, including column 6, lines 62-64).

It would have been obvious to one skilled in this art to form Wada's micro-lenses of PMMA because Sawaki teaches that micro-lenses are conventionally formed of PMMA.

Claim 11 is thus rejected under 35 U.S.C. 103(a) as being unpatentable over Wada together with Sawaki.

Claims 7 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wada (United States Patent 5,371,384) together with Prior Art Figure 1.

Claim 7 depends on independent claim 1. The explanation of the above rejection of independent claim 1 under 35 U.S.C. 102(b) as being anticipated by Wada is hereby incorporated by reference into this rejection of dependent claim 7 under 35 U.S.C. 103(a) as being unpatentable over Wada together with Prior Art Figure 1.

The difference, therefore, between claim 7 and Wada is claim 7's device further comprises a color filter layer between its micro-lenses and light sensitive elements.

Prior Art Figure 1 teaches that color filter layers are conventionally formed between an image sensor's micro-lenses and light sensitive elements (see the specification at paragraph [0003]).

It would have been obvious to one skilled in this art to provide Wada's image sensor with a color filter between its micro-lenses and light sensitive elements, because Prior Art Figure 1 teaches that a color filter layer is conventionally formed between an image sensor's micro-lenses and light sensitive elements.

Claim 7 is thus rejected under 35 U.S.C. 103(a) as being unpatentable over Wada together with Prior Art Figure 1.

Claim 14 depends on independent claim 8. The explanation of the above rejection of independent claim 8 under 35 U.S.C. 102(b) as being anticipated by Wada is hereby incorporated by reference into this rejection of dependent claim 14 under 35 U.S.C. 103(a) as being unpatentable over Wada together with Prior Art Figure 1.

The difference, therefore, between claim 14 and Wada is claim 14's device further comprises a color filter layer between its micro-lenses and light sensitive elements.

Prior Art Figure 1 teaches that color filter layers are conventionally formed between an image sensor's micro-lenses and light sensitive elements (see the specification at paragraph [0003]).

It would have been obvious to one skilled in this art to provide Wada's image sensor with a color filter between its micro-lenses and light sensitive elements, because Prior Art Figure 1 teaches that a color filter layer is conventionally formed between an image sensor's micro-lenses and light sensitive elements.

Claim 14 is thus rejected under 35 U.S.C. 103(a) as being unpatentable over Wada together with Prior Art Figure 1.

Claims 5 and 12 are objected to as being dependent upon a rejected base claim, but would be allowable over the prior art of record if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The prior art of record does not disclose or suggest the allowable device taken as a whole, including the trench structure.

Registered practitioners can telephone the examiner at (571) 272-1843. Any voicemail message left for the examiner must include the name and registration number of the registered practitioner calling, and the Application/Control (Serial) Number. Technology Center 2800's general telephone number is (571) 272-2800.

*Mark Prenty*  
Mark V. Prenty  
Primary Examiner